

REMARKS

Claims 20 and 21 stand rejected under 35 USC 103 as being unpatentable over Owen (US 5841099) in view of Neil (6809291), Kobayashi (20040173942), and Kelly (5683600). Claims 22-26, 28-36, 38, and 39 stand rejected under 35 USC 103 as being unpatentable over Owen (US 5841099) in view of Neil (6809291), Kobayashi (20040173942), and Kelly (5683600), in further view of Mead (6541731). Claims 27 and 37 stand rejected under 35 USC 103 as being unpatentable over Owen (US 5841099) in view of Neil (6809291), Kobayashi (20040173942), and Kelly (5683600), Mead (6541731), in further view of Mega (20040169022).

Claims 21, 26, 28 and 32 have been canceled herein. The limitations of claims 26 and 28 have been moved into independent claim 22.

Applicant's Response to 35 USC 103 Rejections of Claims 20 and 21

Applicant has amended claim 20, 22, and 31 as supported at least by paragraphs 22-25, and 33-34 and FIG. 2. The term "flat" is supported at least by paragraph 10, i.e. homogenous/inhomogeneous surface, and paragraph 17, i.e. "In particular the inner surface of the diffusor 13 should be flat in order to allow a medium to flow out of the hole 7 in an optimum way."

Examiner states in the third full paragraph of page 3 "In view of Neil and Kobayashi, it would have been obvious to adapt Neil or Kobayashi..." Applicant assumes Examiner intended to adapt *Owen* with Neil or Kobayashi.

Applicant first asserts that Owen teaches away from being modified as proposed. Owen teaches varying the power density used per layer by varying the pulse repetition rate. (Column 3, line 42). However, Owen never teaches or suggests varying the pulse width (length). In fact, Owen repeatedly suggests the first and second laser pulses having the same pulse width. For example: "The method of claim 1 in which the first **and** second laser pulses have a temporal pulse width shorter than about 100 ns." (Claim 4). (See also: claim 26). As noted by the equations at column 10, lines 57-67, the equation for power density includes both the repetition rate and the pulse width (length) in the calculation. Owen chose to alter the power density by altering the repetition rate, while maintaining the same pulse width. To modify the laser pulse width of Owen would be to change the principle of operation of Owen, which is impermissible per MPEP 2143.01(VI). Applicant respectfully requests the rejections of all claims based on Owen be withdrawn.

If Owen is modified, Applicant asserts that Owen still does not teach Applicant's amended claims. First, Owen teaches a ceramic substrate and a metallic nickel layer, in contrast to the present invention. Owen teaches "a first laser output of high power density to ablate the **metallic layer** and a second laser output of a lower power density to ablate the **dielectric layer**." (Abstract). Further, "The parameters of the output pulses are selected to facilitate substantially clean, simultaneous drilling or via formation in a wide variety of materials such as metals, organic dielectrics, and reinforcement **materials having different thermal absorption characteristics** in response to ultraviolet light." (Column 3, lines 1-7). Owen further teaches "[a]n object of the present invention is, therefore, to provide an ultraviolet laser system and method for forming vias in targets having at least a conductor layer and a dielectric layer." (Summary). Thus, because only a single material is used per layer in Owen layer, and the laser characteristics are varied based on the material, Owen only teaches or suggests using a single laser characteristic, i.e. a single pulse width, per layer/material.

In contrast, in amended claim 20 Applicant now claims "wherein the hole comprises a first region comprising a flat wall" and "using a plurality of pulses of shorter laser pulse length to produce the flat wall; and using a plurality of pulses of **longer** laser pulse length to **remove remaining first region material** and to produce the second region." Thus, unlike Owen, Applicant claims using differing pulse lengths in the same region (layer). Owen teaches away from such a use of its varying pulse lengths because Owen teaches selecting the laser characteristics based on the material, and the material in the Owen layer is same throughout the entire layer, so only a single laser characteristic per layer/region is taught or suggested. Applicant understands Neil and Kobayashi are being used to teach results known in the art when using short and long laser pulses in such operations, and these known results would guide one familiar with Owen to use short pulses for a layer when short pulse results are wanted for that layer, and long pulses for a layer when long pulse results are wanted for that layer. However, neither teaches or suggests Applicant's claim language, and thus modifying Owen with either or both does not teach or suggest Applicant's claim 20. Neil discloses using shorter and longer pulses in repeated pairs, unlike the present invention. Nor does Kelley teach or suggest the

limitations not taught or suggested by Owen. Applicant respectfully requests the 35 USC 103 rejection of claim 20, be withdrawn.

Claim 22 has been amended to now claim “using a plurality of pulses of shorter laser pulse length in a first process step for producing the flat wall; using a plurality of pulses of longer laser pulse length in a second process step for removing remaining first region material and for producing the second region.” The arguments applied to claim 20 also apply to claim 22, so Owen in view of Neil and Kobayashi and Kelley does not teach or suggest all the limitations of claim 22, and Mead does not teach or suggest the limitations not taught or suggested by Owen in view of Neil and Kobayashi and Kelley. Applicant respectfully requests the 35 USC 103 rejection of claim 22, and dependent claims 23-25, and 29-30, be withdrawn.

Claim 31 has been amended to now claim “using a plurality of pulses of a shorter laser pulse length for producing the flat wall of the hole; using a plurality of pulses of a longer laser pulse length for removing remaining first region material and for producing a second region of the hole.” The arguments applied to claim 20 also apply to claim 31, so Owen in view of Neil and Kobayashi and Kelley does not teach or suggest all the limitations of claim 31, and Mead does not teach or suggest the limitations not taught or suggested by Owen in view of Neil and Kobayashi and Kelley. Applicant respectfully requests the 35 USC 103 rejection of claim 31, and dependent claims 33-36, and 38-39, be withdrawn.

Claims 27 and 37 depend from claims 22 and 31 respectively. Claims 22 and 31 have been shown to survive application of Owen in view of Neil and Kobayashi and Kelley and Mead. Mega does not teach or suggest the limitations not taught or suggested by Owen in view of Neil and Kobayashi and Kelley and Mead, and thus claims 27 and 37 survive application of Owen in view of Neil and Kobayashi and Kelley and Mead and Mega, so dependent claims 27 and 37 must necessarily survive. Applicant respectfully requests the 35 USC 103 rejection of claims 27 and 37 be withdrawn.

(Continued on the next page)

Conclusion

The commissioner is hereby authorized to charge any appropriate fees due in connection with this paper, including the fees specified in 37 C.F.R. §§ 1.16(c), 1.17(a)(1) and 1.20(d), or credit any overpayments to Deposit Account No. 19-2179.

Respectfully submitted,

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